

WHAT IS CLAIMED IS:

1. A vehicle apparatus comprising:
  - a travel direction command determining section configured to determine whether a forward travel command or a reverse travel command has been issued;
  - 5 an electric motor counterelectromotive force detecting section configured to detect a counterelectromotive force of an electric motor that drives a wheel of a vehicle; and
  - a wheel rotational direction determining section configured to determine whether the wheel is rotating in an opposite direction to a vehicle travel direction command determined by the travel direction command determining section, based on a
  - 10 determination that a polarity of the counterelectromotive force detected by the electric motor counterelectromotive force detecting section does not match the vehicle travel direction command determined by the travel direction command determining section.
2. The vehicle apparatus as recited in claim 1, further comprising
  - 15 an electric motor rotational speed detecting section configured to detect a rotational speed of the electric motor; and
  - a determination control section configured to allow the wheel rotational direction determining section to execute a determination when the electric motor rotational speed detected by the electric motor rotational speed detecting section is at least equal to a
  - 20 prescribed speed, and prohibit the wheel rotational direction determining section from executing a determination when the electric motor rotational speed is less than the prescribed speed.
3. The vehicle apparatus as recited in claim 1, wherein
  - 25 the wheel rotational direction determining section further configured to maintain a determined result made by the wheel rotational direction determining section until the vehicle stops, and reset the determined result when the vehicle restarts.

4. The vehicle apparatus as recited in claim 1, further comprising  
a clutch engagement command section configured to command an engagement of a  
clutch disposed between the electric motor and the wheel when the electric motor is  
required to drive the wheel; and

5 a clutch engagement prohibiting section configured to prohibit the engagement of  
the clutch by the clutch engagement command section, when the wheel rotational direction  
determining section determines that the wheel is rotating in the opposite direction to the  
vehicle travel direction command determined by the travel direction command  
determining section.

10 5. The vehicle apparatus as recited in claim 1, further comprising:  
a clutch engagement command section configured to command an engagement of a  
clutch disposed between the electric motor and the wheel when the electric motor is  
required to drive the wheel; and

15 a clutch engagement control section configured to drive the electric motor in a  
direction corresponding to the rotational direction of the wheel, and then allow the  
engagement of the clutch by the clutch engagement command section, when the wheel  
rotational direction determining section determines that the wheel is rotating in the  
opposite direction to the vehicle travel direction command determined by the travel  
20 direction command determining section.

6. The vehicle apparatus as recited in claim 5, wherein  
the clutch engagement control section is further configured to allow the  
engagement of the clutch, when input and output rotational speeds of the clutch are  
25 substantially equal.

7. The vehicle apparatus as recited in claim 5, further comprising  
an electric motor output control section configured to control the electric motor to  
generate output torque in a direction corresponding to the vehicle travel direction  
30 command determined by the travel direction command determining section, when the  
clutch is engaged in accordance with the clutch engagement command section.

8. The vehicle apparatus as recited in claim 1, further comprising  
an internal combustion engine driving a non-electric motor driven wheel; and  
a generator driven by the internal combustion engine to generate electrical power  
to drive the electric motor.

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9. The vehicle driving force control apparatus as recited in claim 8, further  
comprising

a surplus torque computing section configured to compute a surplus torque that  
substantially corresponds to a difference magnitude by which a drive torque transferred  
10 from the main drive source to a second wheel exceeds a road surface reaction force limit  
torque of the first wheel; and

a generator control section configured to control a generation load torque of the  
generator to substantially correspond to an acceleration slippage magnitude of the second  
wheel, when acceleration slippage is determined to be occurring in the second drive wheel.

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10. The vehicle driving force control apparatus as recited in claim 9, wherein  
the generator control section is further configured to compute an electric motor  
torque based on the surplus torque.

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11. The vehicle apparatus as recited in claim 9, further comprising  
an electric motor rotational speed detecting section configured to detect a rotational  
speed of the electric motor; and

a determination control section configured to allow the wheel rotational direction  
determining section to execute a determination when the electric motor rotational speed  
25 detected by the electric motor rotational speed detecting section is at least equal to a  
prescribed speed, and prohibit the wheel rotational direction determining section from  
executing a determination when the electric motor rotational speed is less than the  
prescribed speed.

12. The vehicle apparatus as recited in claim 9, wherein  
the wheel rotational direction determining section further configured to maintain a  
determined result made by the wheel rotational direction determining section until the  
vehicle stops, and reset the determined result when the vehicle restarts.

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13. The vehicle apparatus as recited in claim 9, further comprising  
a clutch engagement command section configured to command an engagement of a  
clutch disposed between the electric motor and the wheel when the electric motor is  
required to drive the wheel; and

10 a clutch engagement prohibiting section configured to prohibit the engagement of  
the clutch by the clutch engagement command section, when the wheel rotational direction  
determining section determines that the wheel is rotating in the opposite direction to the  
vehicle travel direction command determined by the travel direction command  
determining section.

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14. The vehicle apparatus as recited in claim 9, further comprising:  
a clutch engagement command section configured to command an engagement of a  
clutch disposed between the electric motor and the wheel when the electric motor is  
required to drive the wheel; and

20 a clutch engagement control section configured to drive the electric motor in a  
direction corresponding to the rotational direction of the wheel, and then allow the  
engagement of the clutch by the clutch engagement command section, when the wheel  
rotational direction determining section determines that the wheel is rotating in the  
opposite direction to the vehicle travel direction command determined by the travel  
25 direction command determining section.

15. The vehicle apparatus as recited in claim 14, wherein  
the clutch engagement control section is further configured to allow the  
engagement of the clutch, when input and output rotational speeds of the clutch are  
30 substantially equal.

16. The vehicle apparatus as recited in claim 14, further comprising  
an electric motor output control section configured to control the electric motor to  
generate output torque in a direction corresponding to the vehicle travel direction  
command determined by the travel direction command determining section, when the  
5 clutch is engaged in accordance with the clutch engagement command section.

17. A vehicle apparatus comprising:  
travel direction command determining means for determining whether a forward  
travel command or a reverse travel command has been issued;  
10 electric motor counterelectromotive force detecting means for detecting a  
counterelectromotive force of an electric motor that drives a wheel of the vehicle; and  
a wheel rotational direction determining means for determining whether the wheel  
is rotating in an opposite direction to a vehicle travel direction command determined by  
the travel direction command determining means, based on a determination that a polarity  
15 of the counterelectromotive force detected by the electric motor counterelectromotive  
force detecting means does not match the vehicle travel direction command determined by  
the travel direction command determining means.

18. A method for a vehicle comprising:  
20 determining whether a vehicle travel direction command has been issued is a  
forward travel command or a reverse travel command;  
detecting a counterelectromotive force of an electric motor that drives a wheel of  
the vehicle; and  
determining whether the wheel is rotating in an opposite direction to the vehicle  
25 travel direction command that has been determined, based on a determination that a  
polarity of the counterelectromotive force that has been detected does not match the  
vehicle travel direction command that has been determined.